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(54) CHARACTER BROADCAST RECEIVER

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SPECIFICATION

TITLE OF THE INVENTION

Character broadcast receiver

SCOPE OF PATENT CLAIMS

A character broadcast receiver furnished with a character multiplex signal decoder circuit and a mixing circuit for mixing a character image signal from this decoder circuit with a TV image signal and displaying a character broadcast program on the screen in place of a TV program or overlaying a character broadcast program over a TV program, configured in such a way as to select between whether or not to display the aforesaid character image on the aforesaid screen based on a control signal and whether or not to make a copy of the aforesaid character image by the aforesaid copy device based on a control signal received from the aforesaid control decoder

DETAILED DESCRIPTION OF THE INVENTION

In recent years, various types of TV multiplex broadcasting have been devised to effectively use broadcasting signals. One such method devised for domestic use is TV multiplex character broadcasting, which makes it possible to display information pro-

grams such as weather reports, stock markets, traffic information and price indexes on a TV receiver screen whenever viewers wish to see these programs.

One example of such a character broadcasting method comprises inserting a digital pattern signal into at least one horizontal segment of a vertical blanking interval in each field of a TV image signal, e.g. inserting a digital character pattern signal into the 20th horizontal segment (hereafter referred to as "20H") and the 283rd horizontal segment (hereafter referred to as "283H") of each frame, transmitting multiple programs by time-sharing with a 200 field interval per program as the unit, and creating a single image based on the information transmitted in this 200 field interval, i.e. the information in 200 horizontal segments.

This method makes it possible to create a single screen out of up to 15 characters on 8 lines.

The structure of the inventive character multiplex signal is as follows. In short, Figure 1 shows 20H or 283H of the TV image signal with the superimposed character information signal; Figure 1-A is the character multiplex signal L_D. S_H is the horizontal

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synchronization pulse; and S_B is the color burst signal. The character image signal is inserted into the interval after this color burst signal S_B , and is referred to as a data packet.

This data packet comprises a 48-bit header S_C and a 248-bit information data part S_D , and is divided into control packet (Figure 1-B) and pattern packet (Figure 1-C) due to differences in the content of the information data part S_D . The control packet is further divided into a page header control packet sent to the head of each page, and a line control packet sent to the head of each line.

The structure of the header part S_C is the same in the control packet and the pattern packet, with the 16 bits after the color burst signal S_B being the clock line RI; the next 8 bits being the framing code FC that provides frame synchronization indicating the start; the next 8 bits being the packet identification code IDC for identifying whether the method of displaying the character broadcast program on the screen is the C method, wherein a still image is displayed over the entire screen; the S method, wherein two lines are displayed on the bottom of the screen; the T method, wherein one line is scrolled horizontally across the bottom of the screen; or the X method, wherein the entire screen is scrolled vertically; the next 8 bits and the 8 bits afterwards being the program channel code PC_1 and PC_2 for distinguishing between, e.g., 256 character broadcast program channels.

In the control data part S_D , signals related to methods of controlling the entire page such as erase and background color are overlapped over the page header control packet; line code RC for identifying the current line of the screen and color code CC for identifying the character color for the line are overlapped in the line control packet; and pattern data PD for displaying characters or diagrams divided into single horizontal line units are overlapped in the pattern packet.

In this case, the first 4 bits of the framing code FC, pattern identification code IDC, program channel code PC_1 & PC_2 and line code RC are information bits, and the last 4 bits are redundant bits for error correction.

Note that $8/5 f_{sc}$ (chrominance subcarrier frequency or f_{sc}) is 3.58 MHz in NTSC) has been se-

lected as the basic clock frequency for the above code signals.

Character broadcast programs are selected in the following manner.

In short, Figure 2 illustrates one example of a character broadcast receiver. In this figure, (1) is the receiver antenna, (2) is the tuner, (3) is the image intermediate frequency amplifier circuit, and (4) is the image detector circuit. Image detection output from the image detector circuit (4) is supplied via the buffer amp (5) to the mixer circuit (6) for mixing the TV program and character broadcast program.

(10) is the decoder circuit for the character multiplex signal. Output from the buffer amp (5) is supplied to the character information signal L_D sampling circuit (11). Output from the video detector circuit (4) is supplied to the synchronization signal separator circuit (12), which retrieves the horizontal synchronization signal S_H and the vertical synchronization signal S_V , and these signals S_H and S_V are then supplied to the counter (13). This counter (13) then provides the sampling pulse for the 20th horizontal segment and the 283rd horizontal segment, which is supplied to the sampling circuit (9), providing the character information signal L_D . The character information signal L_D thus obtained is supplied to the buffer memory (15) via the serial-parallel converter (14) and stored temporarily. Output from the buffer memory (15) is then supplied to the transmission gate circuit (16).

The character information signal L_D from the sampling circuit (11) is also supplied to the program channel code extraction circuit (17), providing the program channel codes PC_1 and PC_2 , which are supplied to the comparison circuit (18).

(19) is the character program channel selector. When a character broadcast program is selected using this selector (19), a program specification code SPC denoting the program channel code PC_1 and PC_2 for the selected character program is obtained from the encoder (20) and supplied to the comparison circuit (18).

When this program specification code SPC matches the program channel code PC_1 and PC_2 for the character broadcast signal received from the

extraction circuit (17), a matching signal is obtained from the comparison circuit (18) and supplied to the transmission gate circuit (16). The gate is then switched to open, and the character information signal L_D that has been written in the buffer memory (15) is supplied to the main memory (21) to be stored. As mentioned earlier, the character information signal for one program continues for a period of 200 fields. Therefore, the aforesaid action is repeated for a period of 200 fields, and 20H and 283H of the character information signal L_D are written in sequence to the main memory (21) to be stored. This completes the process of drawing one screen. Information written to the main memory (21) is then supplied to the parallel-serial converter (22), where it is converted to a serial signal V_i and obtained via the decoder circuit (10).

In addition, the signal from the buffer amp (5) is supplied to the burst gate circuit (23), which in turn provides the burst signal S_B . This signal is then supplied to the 3.58 MHz continuous wave signal formation circuit (24) to obtain the continuous wave signal S_S . The continuous wave signal S_S is supplied to a multiplication circuit (25) comprising a PLL (phase locked loop) circuit, which creates a signal with a frequency 8 times 3.58 MHz. This signal is supplied to the division circuit (26) and divided to 1/5. The signal output from this division circuit (26) is supplied to the pulse formation circuit (27).

The character information signal from the sampling circuit (11) is supplied to the clock line RI, framing code FC and pattern identification code IDC extraction circuit (28), which provides the clock line RI, framing code FC and pattern identification code IDC. The clock line RI and framing code FC are supplied to the divider (26) and the pulse formation circuit (27). The pulse formation circuit (27) provides a clock pulse synchronized with these, which is in turn supplied as a transfer clock to the serial-parallel converter (14) and parallel-serial converter (22), as well as being supplied as the write and read clock pulse to the buffer memory (15) and main memory (21). Finally, the extraction signal is supplied to the program channel code extraction circuit (17). Furthermore, a pattern identification code IDC is supplied to the pulse formation circuit (27) along with a horizontal synchronization signal S_H and a vertical synchronization signal S_V . The formation circuit (27) provides

the blanking signal BLK for the TV broadcasting reception signal, which is provided by the decoder circuit (10).

The character information signal from the parallel-serial converter (22) and the blanking signal from the formation circuit (27) are supplied to the mixing circuit (6), mixed with the TV broadcasting reception signal from the buffer amp (5), supplied to the image display circuit containing the CRT (7), and shown on the screen of the CRT (7) as a character broadcast program either in place of the TV broadcast program or overlaid over the TV broadcast program.

In the case of character broadcast images such as stock market or traffic information, it is preferable, due to the nature of the information, that this information be displayed in such a way that it can be left fixed in place.

A means of doing this is to make a hard copy of the image shown on the screen of the CRT.

However, in many cases, it would be necessary to display these character images on the screen to make it possible to make a copy of them and print them out.

In short, the original purpose of character broadcasting, particularly in the case of the C-format, is to display characters onto the screen at the expense of the TV program image, meaning that character broadcasting has the drawback of blanking the TV program image. Creating a hard copy of the character image would therefore make it possible to display the TV program image on the screen without hindering the TV program image.

This invention was devised with a view to the above, and has for its purpose to provide a means of making a hard copy of a character broadcast image irrespective of whether or not the character broadcast image is displayed on the screen.

Below is a description of a device according to this invention, with reference to Figure 3.

In short, the output V_i from the parallel-serial converter (22) in a decoder circuit (10) for character multiplex signals is supplied to a mixer circuit (6) via a switch circuit (30), and a blanking signal BLK from a pulse formation circuit (27) is supplied to a mixing circuit (6) via a switch circuit (31).

The output V_i from the parallel-serial converter (22) is also supplied to a copy device (33) via a switch circuit (32).

In addition, (34) is a control key device that is furnished with a display key (35) and a copy key (36), in addition to other control keys (37). When these keys are operated, a code is provided by the device (34) based on the key pressed, and supplied to the control decoder (40).

The decoder (40) supplies a switch signal D_{sw} as well as a switch signal C_{sw} . The signal D_{sw} is provided to the switch circuit (30) and (31), while the signal C_{sw} is provided to the switch circuit (32).

The decoder (40) also supplies a signal to the copy device (33), which provides the control signal CTL that controls this signal.

When the display key (35) is switched on, the signal D_{sw} from the decoder (40) is switched from 0 to 1, turning on the switch circuit (30) and (31). Furthermore, when the copy key (36) is turned on, the signal C_{sw} from the decoder (40) is switched from 0 to 1, turning on the switch circuit (32), and starting copying by the copy device (33) by the control signal CTL.

When the other control keys (37) are operated, the control signal CTL performs various other operations on the copy device (33) such as switching lines, and switching between positive and negative copies.

Note that in this example, the key device (34) is also furnished with a character broadcast program channel selector (19) and a selector key (38).

This configuration allows the user to display the character broadcast screen on the CRT (7) by selecting the desired character program using the select key (38) and turning on the display key (35). This turns on the switch circuit (30) and (31) by the switching signal D_{sw} , so that when the received character broadcast program matches the program selected by the select key (38), the contents of the main memory (21) and the blanking signal BLK are supplied to the mixing circuit (6) via the switch circuit (30) and (31). Consequently, the character image for the selected program is displayed on the screen of the CRT (7).

Next, to make a copy of the character image in addition to displaying it on the screen of the CRT (7), the copy key (36) is turned on. This causes the switch signal C_{sw} to turn on the switch circuit (32) and supplies the character information signal V_i for the

specified program stored in the memory (21). In addition, the control signal CTL moves the device (33) to the start copy mode, providing a copy of the screen displayed on the monitor.

Next, to make a hard copy of the image without displaying it on the screen of the CRT (7), the character program is selected with the selector key (38), the display key (35) is set to off, and the copy key (36) is set to on. As a result, the switch circuits (30) and (31) are turned off, so the character information signal V_i and blanking signal BLK are not supplied to the mixing circuit (6), and the character image is not displayed on the screen.

On the other hand, the switch circuit (32) is turned on, and the copy device (33) is switched to the start copy mode. Consequently, it is possible to make a copy of the character image without displaying it on the screen.

As explained above, by using this invention, it is possible to choose whether or not to display a character image on the screen, and whether or not to make a copy of the character image, simply by operating the keys of a control key device.

Consequently, it is possible to make a hard copy of the character program image without sacrificing the TV program image. Therefore, with this invention, for example if the TV program in question were an educational program, it would be possible to transmit the text written by a teacher onto a blackboard as a separate text multiplex signal, and to superimpose this text over the screen, totally independent from the information on the screen, so that viewers of the program such as students would be able to make a hard copy of the text without having the image of the teacher impaired.

Furthermore, it is not necessary to use a control key device to select whether or not to display the character image on the screen of the CRT or to make a copy of the character image, as shown in the figure. It is also possible, instead, to insert a control code into the character multiplex signal at the broadcasting station level.

In short, in the case of an educational program, by transmitting the text as a character multiplex signal and superimposing a control code for making a

copy of the character information without displaying the character image on the screen of the CRT onto this signal, it is possible to feed this text based on the content of the educational program without hindering viewing of the educational program image.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a diagram illustrating the character multiplex signal, Figure 2 is a flowchart illustrating one example of a character broadcast reception device, and Figure 3 is a flowchart illustrating one example of the inventive character broadcast reception device.

(6) is the mixing circuit, (7) is the CRT, (10) is the decoder circuit for the character multiplex signal, (30) through (32) are switch circuits, (33) is the copy device, (34) is the control key device, and (40) is the control decoder.

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FIGURE 1

[see source for figure]

One horizontal segment
Data packet

FIGURE 2

[see source for figure]

Teletext Print

FIGURE 3

[see source for figure]

35 Display

36 Copy



Affidavit of Accuracy

I, Kyle Leslie, hereby certify that the following is, to the best of my knowledge and belief, a true and accurate translation of the following document [JP 56-8975] from Japanese into English.

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